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1. Your reference

J.24195 GB

05 AUG 1996

2. Patent application number

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9616406.6

05 AUG 1996

3. Full name, address and postcode of the or of each applicant (underline all surnames)

BRITISH SKY BROADCASTING LTD.  
Grant Way  
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Middlesex TW7 5QD

Patents ADP number (if you know it)

6784409001

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

IMPROVEMENTS IN RECEIVERS FOR  
TELEVISION SIGNALS

5. Name of your agent (if you have one)

R.G.C. JENKINS & CO.  
26 Caxton Street  
London SW1H 0RJ

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

Patents ADP number (if you know it)

950001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number  
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Date of filing  
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing  
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8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

YES

- a) any applicant named in part 3 is not an inventor, or
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Abstract	1
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Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*) 1

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11. I/We request the grant of a patent on the basis of this application.

Signature

*R.G.C. Jenkins & Co.*

Date 5 Aug 1996

R.G.C. JENKINS & CO.

12. Name and daytime telephone number of person to contact in the United Kingdom

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IMPROVEMENTS IN RECEIVERS FOR TELEVISION SIGNALS

The invention relates to improvements in receivers for television signals.

Background of the Invention

5           At present most television broadcasting, regardless of medium over which the signal is broadcast (Terrestrial, Cable, Satellite), is analogue based and comprises a single television service (e.g. SKY ONE, SKY SPORTS, SKY MOVIES) transmitted on a  
10           carrier signal or channel. However, the use of digital based broadcast technology is imminent. Digital broadcast technology will enable television service companies to transmit in a single channel high definition television programmes, or plural programmes  
15           at conventional definition or multiple customer services, or a combination of these.

          In a conventional analogue-based television broadcast system programmes (or "services") are broadcast by separate television service companies on  
20           a single carrier signal ("channel"). In a digital based broadcast system it is possible to broadcast plural services multiplexed together on a single carrier. Unless the context requires otherwise the term "channel" will be used herein to refer to the  
25           bandwidth used by a single service to broadcast television programmes or other customer services. The term "channel" therefore encompasses both an entire

carrier signal (when the signal is used entirely by a single service) and a portion of a carrier signal (when the signal is shared by plural services).

5       The ability to transmit multiple channels in a single carrier signal enables a far greater number of services to be provided in the digital domain than is possible in the analogue domain. Some of the channels in a carrier may be used to provide conventional television programmes while simultaneously other  
10       channels in the carrier are used to provide data for other customer services such as television programme listings, on-line programme ordering or so-called pay-per-view (PPV) services, and so on. Customer services should not be confused with the "services" provided by  
15       television companies as discussed hereinabove.

      In addition to such television related services some of the channels in a carrier may be used to provide on-line shopping facilities by which a customer may purchase goods and/or services from their  
20       own home. Such on-line shopping is, of course, only possible if there is an element of interaction between the goods/service provider and the customer. The term "interactive services" will be used herein to refer generally to on-line shopping facilities and the like  
25       made available via one or more channels in a digital based broadcast system.

      Digital data compression techniques enable a

single channel to carry simultaneously multiple interactive services. In itself this creates a problem. Many customers will find bewildering the large number of interactive services available to them. If customers become confused they will not make use of the interactive services. Clearly, this is undesirable.

Transmission bandwidth is a finite resource and will remain at a premium even if full advantage is taken of digital data compression techniques. This presents a problem when it comes to providing an interactive service. On the one hand it is desirable to present high quality pictures and graphics. However, higher quality necessitates the use of a larger bandwidth. On the other hand it is desirable to keep costs down because customers will not make use of interactive services if they are significantly more expensive than comparable high street services.

The invention aims to address the above-mentioned and other problems.

In one aspect the invention provides a receiver for receiving broadcast digital television signals representing both image data and information data, the receiver being responsive to the information data to output for display data derived from said image data and said information data and representing an interactive image, and being responsive to viewer

manipulation of an input device to vary the  
interactive image and to establish a  
telecommunications link to a remote site for on-line  
interaction via the interactive image between the  
viewer and the remote site.

In another aspect the invention provides a method  
of interacting with broadcast interactive services,  
the method comprising receiving signals representing  
both image data and information data, deriving from  
the data in the received signals an interactive image  
for display, responding to manipulation of an input  
device by varying the interactive image, and  
establishing a telecommunications link to a remote  
site for on-line transfer of data therewith in  
response to the manipulation of the input device.

In a further aspect the invention provides an  
interactive services interface comprising: a broadcast  
entry level for enabling a user to select from a range  
of available service types; a first broadcast  
interactive level, entered by user selection of a  
service type in the entry level, for enabling the user  
to select from a group of service providers of the  
selected type; a second broadcast interactive level,  
entered by user selection of a service provider in the  
first broadcast interactive level, for enabling the  
user to select from a range of classes of goods and/or  
services available from the selected service provider;



and a third broadcast interactive level, entered by user selection of a class of goods and/or services, for enabling the user to select goods and/or services from the selected class.

5           The above and further features of the invention are set forth with particularity in the appended claims and together with advantages thereof will become clearer from consideration of the following detailed description of an exemplary embodiment of the invention given with reference to the accompanying  
10           drawings.

Brief Description of the Drawings

In the drawings:

15           Figure 1 is a schematic diagram of a television receiver system;

            Figure 2 is a functional block diagram of a satellite decoder;

20           Figure 3 is a functional diagram showing interaction between hardware and software of the decoder of Fig. 2;

            Figure 4 is a schematic diagram of an interactive services interface structure;

            Figure 5 is a diagram of a menu screen;

25           Figure 6 is a diagram of a screen representing service providers offering interactive services;

            Figure 7 is a representation of a main menu screen of a service provider;

Figure 8 is a diagram of a screen of a service provider;

Figure 9 is a diagram of another screen of a service provider;

5        Figure 10 is a diagram of an on-line screen of a service provider;

Figure 11 is a diagram of another on-line screen;

Figure 12 is a diagram of an interactive level offering services from multiple service providers; and

10        Figure 13 is a diagram of a screen showing some of the multiple service providers of Figure 12.

Detailed Description of an Embodiment of the  
Invention System Overview

Referring now to Figure 1 of the accompanying  
15        drawings a television receiver system 1 comprises a television (TV) 2, a digital integrated receiver decoder 3 (decoder) connected to receive signals from a satellite dish antenna 4, and a video cassette recorder 5 (VCR), and a modem 7. The system 1  
20        optionally further comprises a personal computer 6 (PC) and a games console 8 each connected via respective lines to the decoder 3. SCART connectors or other standard connectors may be used as appropriate. The decoder 3 acts as an interface  
25        between the TV 2 and the VCR 5, PC 6, modem 7 and games console 8 and thus serves to control the system 1.

Receiver/Decoder

Figure 2 of the accompanying drawings shows the decoder 3 in greater detail. The dish antenna receives signals from a satellite (not shown).  
5 Signals from the dish antenna 4 are input to a tuner 12 and from there to a quadrature phase shift key (QPSK) demodulator 13. Demodulated signals are error corrected by way of a forward error corrector circuit 14. Data from the forward error corrector circuit is  
10 supplied to a transport/demultiplexer 15 which separates the data into video data, audio data, user services data, programme scheduling data, etc. for distribution to various locations within the decoder. Satellite (and indeed cable) programmes are usually  
15 scrambled to prevent unauthorised access by non- authorised subscribers. The decoder 3 therefore comprises a conditional access control circuit 16 which cooperates with a smart card 16a to determine whether the viewer has subscribed to a particular  
20 channel and is therefore authorised to access the channel. Parental control over channel access is also provided, at least in part, by the access control circuit 16. The decoder 3 further comprises a descrambling circuit 17 which is controlled by the  
25 access control circuit 16 to enable the descrambling of the signal by authorised subscribers.

The received signals comprise digitally encoded

data. It is envisaged that the data will be compressed using for example the DVB/MPEG 2 standards which permit both programme data and additional data (for example interactive service data) to be transmitted in a single channel. DVB/MPEG 2 enables high compression ratios to be achieved.

Descrambled signals from the descrambling circuit 17 are input to a video decompression and processing circuit 18 and an audio decompression and processing circuit 19, operating according to the MPEG standard for example. Decompressed video signals are input to a SCART interface 20 for direct input to the TV 2 and to a PAL encoder 21 where they are encoded into the PAL format for modulation by a UHF modulator 22 for output to the UHF input of the TV if so desired.

The system 3 is controlled by a processor 23 which communicates with the various units of the system via a bus 24. The processor 23 has associated with it ROM 25 (optionally including a CD-ROM drive 25a), RAM 26 (comprising both dynamic RAM and static RAM) and a flash (non-volatile and writable) memory 27. As will be explained in greater detail hereinafter the processor 23 controls operation of the decoder 3 by controlling the tuner 12 to receive signals for the desired channel from the dish antenna 4 and to control demultiplexing, descrambling and decompression so that the desired programme and/or

interactive service data is displayed on the screen of the TV 2. Viewer selection of desired programmes and customer services is controlled by way of a remote control unit 28 which in response to viewer manipulation thereof transmits control signals to a receiver 29 for input to the processor 23.

The system 3 further comprises a high-speed data interface 30 and an RS232 interface 31 providing a serial link. The high-speed data interface 30 and the RS232 interface may be connected to the PC 6 and/or the games console 8 of Fig. 1 and/or other digital equipment (not shown). The high speed data interface 30 enables the system 3 to be connected to other devices (not shown) for example to enable reception of services transmitted via other media such as broadband cable and digital terrestrial broadcast. The decoder 3 further comprises a modem interface 32 for connecting to a telephone network.

Operation of the decoder 3, especially the processor 23, is controlled by software that makes the processor 23 responsive to control signals from the remote control unit 28 and to data included in the signal received by the dish antenna 4 and in the memory units 25 to 27. A schematic representation of the interaction between hardware and software in the decoder 3 is shown in Figure 3 of the accompanying drawings. The data in an incoming signal is separated

by the transport/demultiplexer 15 into video data and information data. The information data is distributed around the hardware and software, as will be described in greater detail hereinafter. The video data and the audio data is demultiplexed and output in suitable form for supply to a TV by the MPEG video and audio circuits 18 and 19. When information is to be displayed either with or instead of the video, data representing the information is output in suitable form for supply to the TV via an on-screen display (OSD) driver 33 and the video circuit 18. Signals from the OSD driver 33 and the video circuit 18 are combined as appropriate before being supplied to the TV. Operation of the software and hardware of the decoder 3 is based around an operating system 35. The conditional access controller 16 has associated software which interfaces with the operating system. The processor 23 has its own base operating system 37 which interfaces to the decoder operating system 35. Applications such as an intelligent electronic programme guide (IEPG) 39 and other applications 40 including interactive services interface to the operating system 35 via an applications interface 41 and associated application translator 42.

The software for conditional access applications such as the intelligent electronic programme guide 39 are installed permanently within non-volatile memory,

e.g. the ROM 25, of the decoder 3, but variable information such as new access codes and TV programme scheduling details is updated regularly via signals received from the dish antenna 4. Demodulated signals from the demodulator 13 are input to the transport demultiplexer 15 which examines the data to decide where it should be sent. From time to time significant changes may be made to conditional access codes or to the manner in which the intelligent electronic programme guide (IEPG) 39 displays programme information. Also, programmes for additional applications, say an interactive shopping or banking service for example, are also supplied via the satellite for the decoder. Such application data is routed by the transporter 15 directly to the appropriate areas 40 of the store.

Operating data 43 is supplied on a substantially continuous basis in every channel. The operating data 43 includes conditional access data 44 associated with a channel and/or programmes therein which enables the conditional access controller 16 to determine whether or not access should be allowed to a particular programme by descrambling the data therefor. Additionally, operating data relating to interactive services is transmitted in dedicated interactive service channels which carry control and information data for use by the hardware and software of the

processor 23 and the associated memory devices 25 to 27. Thus, the operating data 43 depicted in Figure 3 also includes interactive service programs and information 46 (for example relating to personal banking services) and indeed any other data 47 required on a substantially continuous or regular basis for the aforementioned interactive services.

The transport/demultiplexer 15 is arranged to supply the operating data 43 to the processor 23. The data is acted upon by the operating system 35, the conditional access and/or other operating software. The processor 23 responds to the data by sending appropriate commands or information to other units within the system. Control data is also transferred between the processor 23 and such units as the demultiplexer 15, the video and audio decompressors 18, 19, the remote control receiver 29 and the high-speed data interface 30 via respective drivers 48 to 52.

The combined hardware and software of the decoder 3 enables the data in received channels to be decoded for display of viewer selected programmes and customer services. The scrambling is controlled on a continuous basis and the decoder can be updated with new descrambling codes as and when required. Data for interactive services is supplied and updated substantially continuously and programmes relating to



newly selected interactive services are downloaded into the decoder.

Operation of the decoder 3 in receiving and decoding data representing television programmes and data defining scheduling and other information related to the programmes is described in detail in our International Patent Application No. PCT/GB 96/01228, the teachings of which are incorporated herein by reference. Operation of the decoder 3 in providing interactive services will be described in the following.

#### Interactive Services

The interactive services is hierarchical and interfaces with the viewer as shown in Figure 4 of the accompanying drawings. The structure of the interactive interface 60 represents the order in which information is presented to the viewer and comprises an entry level containing two different entry screens 61, 62 and several different interactive levels 63 to 68. Usually entry into the interactive services will be initiated by the viewer manipulating an "interactive services" key (not shown) on the remote control unit 28 (see Figure 2). The processor 23 is arranged to respond to such manipulation by causing a menu of options to be displayed on the screen of the TV 2. Data defining the menu is stored within the memory devices 25 to 27 of the decoder, with data

defining the form of the menu (i.e. a menu template) being stored semi-permanently (e.g. in non-volatile memory). In a broadcast system, such as satellite broadcast, it is possible to construct the decoder 3 to receive data defining new templates over the broadcast medium so that menus and the like can be updated by the broadcast company without the need for any interaction with the viewer. Data defining the legends appearing in the menu is stored separately to enable the legends also to be changed as and when desired by the broadcast company without affecting the form of the menu.

The menu of options is shown at 73 in Figure 5 of the accompanying drawings and corresponds to the entry screen 61 in Figure 4. Referring to Figure 5 the menu 73 comprises an option bar 74 extending across a top portion of the screen and containing an icon for each of the options "TV Guide" 75, "Box Office" 76, "Customer Services" 77, and "Interactive Services" 78, available for selection by the viewer. The options "TV Guide", "Box Office" and "Customer Services" are described with particularity in our International Patent Application No. PCT/GB 96/01228. As shown in Figure 5 the interactive service option has been selected and the "Interactive Services" icon 78 is highlighted with a bus bar 79 extending therefrom behind ten different legends 80 to 89 representing

services available via the decoder. Icons 75 to 77 appear feint to indicate that those options have not been selected.

5 A single template is used to define the menu for all of the options represented by the icons 75 to 78 so that regardless of which option is selected the look and feel of the menu will be the same. Of course, the legends vary between menus and therefore different legend data will be stored for each option menu. It is technically possible to transmit the  
10 template and legend data for the menu 63 continuously via satellite, but it is preferable that the data is broadcast only occasionally and held in memory within the decoder 3 so that when selected the menu appears without any discernable delay on the screen of the TV  
15 2.

The legends 80 to 89 will, of course, depend on what interactive services are available to the viewer. The legends 80 to 89 shown in Figure 4 are  
20 representative of a broad cross-section of services that may be made available to a viewer and include on-line shopping and financial services, entertainment, education, information and communication. Other categories of service could naturally be provided if  
25 so desired.

A service is chosen by manipulating a numbered key on the remote control unit 28 corresponding to one

of the numbered pointers 90 to 99 next to the legends 80 to 89. The processor 23 responds to such manipulation of a numbered key as a command to select the service corresponding to that number.

5 Alternatively, manipulating "up" and "down" keys on the remote control unit will result in the processor causing each of the legends 80 to 89 and respective pointers 90 to 99 to be highlighted in turn on the TV screen (e.g. legend 81 and pointer 91). Manipulating

10 a "select" key on the remote control unit 28 is interpreted by the processor 23 as a command to select the service corresponding to the highlighted legend.

When a service is selected the processor 23 responds by moving into the first interactive level 63

15 which represents all service providers for the selected category of service. A screen representing some, if not all, of the service providers is displayed on the TV. Figure 6 of the accompanying drawings shows an example of a screen 100 that is

20 displayed if the "shopping" legend 81 is selected from the Figure 5 menu. The screen 100 comprises nine icons 101 to 109 representing the trade marks and/or logos of "shops" offering an on-line shopping service. Template data defining the layout of the icons and

25 logo data defining the logos appearing in the icons is normally transmitted continuously via satellite to be received when required by the decoder. Of course, if

sufficient memory were made available within the decoder 3 the data could be held within the decoder and simply updated from time to time when changes occur. The company names shown in Figure 6 are  
5 exemplary only and should not be taken as indicating any preference or allegiance between those companies and the applicants/assignees of the present invention.

The layout of the screen 100 can be likened to the layout of shops in a shopping mall. Manipulation  
10 of keys on the remote control unit enables the viewer to visit each "shop" in turn should he so wish. Each "shop" has a number displayed in the icon 101 to 109 enabling a shop to be "visited" by manipulation of the corresponding numbered key on the remote control unit  
15 28. When a "shop" is selected by manipulation of the keys on the remote control unit 28 the processor 23 responds by moving into the next, i.e. second interactive level 64 (see Figure 4) where information specific to the selected "shop" is displayed. In  
20 Figure 6 the *Thomas Cook* icon 102 is highlighted and so for the purpose of explanation it will be assumed that the *Thomas Cook* shop is entered by the viewer.

Thus, on entry into the "shop" (by manipulation of the remote control keys) the processor 23 causes  
25 the screen to change to the screen 110 shown in Figure 7 of the accompanying drawings. It should be noted that the screen 110 corresponds to the second

interactive level 64 shown in Figure 4. Continuing the shopping mall analogy entering the screen 110 is equivalent to entering a shop in the mall. The screen 110 is transmitted continuously in a dedicated channel or channel portion and when the "shop" is selected the processor 23 causes the decoder 3 to receive the decoded data from the appropriate channel. Since all screens are defined by only a few templates the feel of each shop screen will be similar insofar as the layout of the screen is concerned. However, within the confines of the template each service provider is free to adapt the appearance of the screen to its own needs.

In the case of the screen 110 the template requires a main title bar 111 to be displayed in an upper portion of the screen, a tool bar 112 to be displayed in a lower portion of the screen, a picture 113 and option legends 114 to be displayed in a central portion of the screen, and a second title bar 115 to be displayed between the central and lower portions of the screen. In the case of screen 110 the main title bar 111 identifies the screen as the main menu of *Thomas Cook*, the second title bar 115 is blank, and the tool bar 112 contains only an "exit" button 116, which enables the viewer to return to the shopping mall screen 100 shown in Figure 6.

Depending on the wishes of the service provider

and its budget to pay for bandwidth, the picture 113 may be still or moving video. Even though compression techniques are used to compress image signals to say 1/8 or 1/16 screen size and the decoder is arranged to decompress the signals to produce a 1/4 screen size image, still pictures require less bandwidth, and are therefore less expensive, than moving videos. An audio track containing narrative, music, sound effects or a mix of all three may also be transmitted for play when the screen 110 is displayed. Where video is shown in the picture portion the audio and video may be synchronised. If the service provider is currently or has recently advertised on television, it may choose to run the advert as video in the central portion of the screen 110.

The legends 114 enable the viewer to select from a range of options by manipulating keys on the remote control unit in a manner similar to that already described hereinabove with reference to Figure 5 and 6 of the drawings. For the purpose of explanation it will be assumed that the option 117 "Specialist/Activity Holidays" has been selected by the viewer. The processor 23 responds to this selection by causing the screen 120 shown in Figure 8 of the accompanying drawings to be displayed. The screen 120 corresponds to the third interactive level 65 shown in Figure 4 of the drawings. In the shopping

mall analogy entering the screen 120 is equivalent to visiting a Specialist/Activities Holidays consultant in a *Thomas Cook* shop. In a department store it would be equivalent to entering a department within the store. Data defining the screen 120 and any associated audio are also transmitted continuously in a dedicated channel from the satellite.

It will be noted that the form of the screen 120 is similar to that of the screen 110 insofar as the screen 120 comprises a main title bar 121, a tool bar 122, a picture 123, option legends 124 and a second title bar 125. However, it will also be noted that the information in the screens 110 and 120 is entirely different and that the layout of the legends 114 and 124 in the central portions of the two screens 110 and 120 is not the same.

In the screen 120 the displayed picture 123 depends on which of the option legends 124 has been selected. For example if the "golf" option 126 is selected a video of a golfing resort may be shown, but if the "cruise" option 127 is selected a sequence of still pictures of a cruise liner may instead be shown. The content of each screen will naturally depend upon the wishes of the service provider and, within the constraints of the predetermined templates, can be varied as desired. Indeed, the choice of which screens to use and in which order is with the service



provider who may for example decide to use the screen 120 as the main menu and the screen 120 for more specific services.

5 It is possible for a service provider to choose a mix of videos and stills in order to achieve the most cost-effective portrayal of its goods or services. It is worth mentioning that videos and sequences of stills can be transmitted either continuously or in a continuous loop. In the case of  
10 a continuous video loop the viewer will enter the loop at random. The loop can be as long as the service provider wishes but will normally be no more than only one or two minutes in length. It is envisaged that the videos and still pictures will be provided for  
15 viewer entertainment and therefore entering a video half way through the loop will not have any detrimental effect. Indeed an entertaining video may encourage a viewer to stay, and buy products and services, and wait for the video to run from beginning  
20 to end rather than just exiting from the screen. Should the service provider consider it important that a video loop is only seen from the beginning a suitable command can be transmitted with the video to wait until the start of the loop before outputting the  
25 video (and accompanying audio).

The tool bar 122 contains three active coloured icons 128 to 130 each having a descriptive legend

displayed therewith and one inactive coloured icon 131. The colours of the icons 128 to 131 correspond to the colours of four coloured keys (not shown) on the remote control unit 28. Manipulating a coloured key on the remote control unit causes the processor 23 to effect the function indicated in the tool bar for that colour. Thus, manipulating the key with the colour corresponding to that of the icon 129 causes the processor to enter a purchase holiday routine.

Instructing code for the purchase holiday routine is transmitted at a convenient time to the decoder. The code may be transmitted as part of an initial download of data in the channel containing the main menu of the service provider, in which case it will be transmitted with data for other routines that may be utilised during viewer interaction with the services of the service provider. Also, the code may be transmitted with the data for screen 120, the code and the data being separated for storage in respective store areas by the transport/demultiplexer 15 (see Figures 2 and 3). When the purchase icon 129 is selected the processor 23 responds by causing the modem 32 to establish a telecoms connection with a predetermined number. The number is transmitted with other data for the screen 120 and corresponds to the number at which the service providers computer is located. While the connection is being established

the video, still picture or still picture sequence 123 continues to be displayed in order to entertain the viewer until the connection is made. Also, an icon 132 representing a modem is displayed. The icon 132 is displayed in one colour and/or flashes while the connection is being made and is displayed in another colour when the connection is established.

Establishing the modem connection places the viewer on-line with the service provider. Modem communication is much slower than the broadcasting of data and generally the modem is used to transfer data directly pertinent to a purchase or whenever a direct exchange of data (conversation) is necessary between the viewer and the service provider. Screen data of a general nature continues to be extracted from the satellite transmission for display. During on-line communication one or more screens corresponding to the levels 66 to 68 in Figure 4 are displayed on the TV screen. The on-line screens may follow the same general format but will tend to be more specific to the purchase or purchases being made.

Figure 9 of the drawings shows an example of screen 140 for use in on-line purchasing from a supermarket company, e.g. J. Sainsbury plc. As with previous screens, the screen 140 comprises a main title bar 141 and a tool bar 142, but the information in the central portion 143 of the screen is of the

purchases being made by the viewer. The image in the central portion 143 is of a till receipt 144 containing entries corresponding to goods to be purchased by the viewer.

5           Data defining the image of the till receipt 144, the background of the central portion 143, the highlight 145 over a selected item and the price and subtotal boxes 146 is transmitted via satellite together with the title bar 141 and tool bar 142 data.

10       Data corresponding to the goods is stored in memory when goods are selected in the previous screen. This data is originally transmitted via satellite or may be retrieved on-line via the modem depending on the service provider's setup. Data corresponding to the

15       price of the selected goods is received via the modem from the service provider's computer and converted via the processor 23 into a suitable form for display on the screen 140. Price and subtotal data is calculated by the processor 23 in accordance with a program

20       transmitted with the data defining the screen 140 via satellite. The coloured icons 147 to 150 enable the user to control the processor 23 to move between different screens, thereby enabling the user to move up to the previous screen (corresponding to the level

25       65 in Figure 4) to select further goods for purchase, and to move on to the next screen (corresponding to the level 67 in Figure 4) to complete the purchase.

Programs relating to each coloured icon 147 to 150 are, of course, also transmitted via satellite.

5       Selecting the "checkout" icon 148 causes the processor 23 to change the TV display to the screen 153 shown in Figure 10 of the drawings. The screen 153 corresponds to the level 67 in Figure 4. As with previous screens, the screen 153 comprises a main title bar 154 and a tool bar 155. The central portion comprises a list 156 of days and dates and a list 157 of delivery times. Manipulation of keys on the remote control unit enables the user to specify a day, data and time for delivery. As with the screen 140 in Figure 9, most of the data for the screen 153 is received via satellite, with just data pertinent to the transaction being received/transmitted via the modem.

15       The tool bar 155 contains "cancel" and "accept" icons 158, 159. The viewer is therefore free to cancel his order at any time, the order only being placed when the "accept" icon 159 is selected. The tool bar 155 also contains a "main menu" icon 160. This icon will be included in most screens to enable the viewer to return to the main "shop" screen corresponding to the level 64 in Figure 4, e.g. the *Thomas Cook* screen 110 shown in Figure 7.

25       The tool bar 155 also contains a "my list" icon 161. It has been determined that for a typical

household 80% of the weekly purchase remains the same between one week and the next. It is envisaged that supermarket companies will keep a record of each viewers previous purchase which can be called up on-line next time the viewer uses the on-line shopping service. This will simplify the viewer's weekly on-line shopping.

When the accept icon 159 is selected the processor 23 responds by causing a confirmation screen (not shown) corresponding to the level 68 in Figure 4 to be displayed on the TV screen. The confirmation screen is of a similar format to that of other screens and contains data from the service provider's computer confirming the order, price and time of delivery and identifying a reference number to enable the order to be identified in the event of a query.

Security is of great importance in any form of interactive services. The system so far described is inherently secure because the decoder 3 contains a subscription smart card 16a unique to the subscriber's household. The smart card 16a includes data identifying the household therefore enabling interactive services to be tailored automatically (as far as the viewer is concerned) to the viewers locality. Thus, for example, on-line supermarket shopping can be between the viewer and his nearest supermarket branch.

Security is provided by the use of personal identification numbers, so-called PIN numbers, which are known only to individual viewers in a household and are used to identify the individual viewers to a particular service provider. In a given household there will normally be only one subscriber to television services, but most likely there will be more than one viewer. Individual PIN numbers can be assigned to several viewers in a household thus enabling each of the viewers to place on-line orders for goods and services without fear of other viewers in the household making on-line purchases in his name.

Of course, banks and financial institutions have been making use of PIN numbers for security purposes for several years. Figure 11 of the accompanying drawings shows an example of a screen 170 containing a main menu for a bank. A central portion 171 is defined between a main title bar 172 and a tool bar 173 and contains a region 174 for display of a picture and a region 175 in which various identity number boxes 176 to 178 are displayed. Normally, the screen 170 would be displayed once the viewer is ready to confirm his order and therefore corresponds to a level between levels 67 and 68 in Figure 4. Naturally, the identity numbers can be requested at any convenient time in the interactive procedure.

In the screen 170 three identity numbers are

requested. The first number is the viewer's PIN number for the television company. This first PIN number identifies the viewer as a specific person in a subscribing household as above-mentioned. The box 5 176 is first highlighted and then the viewer's PIN number is entered in the box 176 by manipulation of numbered keys on the remote control unit 28. The processor 23 responds to manipulation of a key by causing a non-numerical symbol, such as an asterisk, 10 to be displayed in the box 176. The displaying of the symbol may be accompanied by an audible beep or other sound. All the viewers PIN numbers are stored within the memory of the decoder 3 or within the smart card 16a and the processor 23 is arranged to respond to an 15 incorrect number being entered with suitable prompts. When all digits of the viewer's PIN number have been received, the processor 23 indicates acceptance of the first PIN number by highlighting the account number box 177.

20 Entry of the account number is by manipulation of the numbered keys on the remote control unit 28 to which the processor responds by causing the digits of the account number to be displayed in the box 177. Data representing the account number is transmitted to 25 the bank's computer (not shown) via the modem and the bank's computer responds by transmitting back to the decoder 3 a command to request the PIN number for the



account. The processor 23 responds to the command by causing the box 178 to be highlighted. The account PIN number is entered in a similar manner to the company PIN number with the entering of each digit being acknowledged by the displaying of non-numerical symbols in the box 178. Once the account PIN number has been so entered data representing the same is transmitted to the bank's computer (in encrypted form) which responds with a suitable command to the processor 23. If the PIN number is incorrect the command will be to display suitable prompts for the viewer to re-enter the number. If the PIN number is correct the command will be to proceed with the transaction and the processor will respond by moving onto the display of a verification screen corresponding to level 68 in Figure 4.

It will, of course, be appreciated that the display shown in Figure 11 is merely an example of the use of PIN numbers in relation to on-line banking services. In other circumstances, such as the purchase of goods from an on-line shopping service, PIN numbers may be used in conjunction with credit card numbers to effect payment for goods by way of a credit/debit card. In such circumstances the screen would be similar to that shown in Figure 11 so as to maintain the same overall look and feel but with detail changes relevant to the specific transaction.

As shown in Figure 2 the decoder 3 may include a second card reader 16b for reading a second card. Presently banks and other financial institutions are generally using magnetic strip cards as debit, credit and loyalty cards. The second card reader may therefore be suitable for reading magnetic strips. However, banks will shortly be moving over to "smart" cards because such cards offer greater security than conventional magnetic strip cards. The second card reader 16b may therefore be suitable for use with smart cards. A third possibility would be to use electronic cards which are "charged" with a case value and the cash value is reduced by the cost of the transaction each time the card is used. The second card reader 16b may be suitable for use with a cash card. Regardless of the type of card chosen the security is increased by the second card reader 16b because the viewer must present to the decoder the company subscription card and the PIN number for that card, and the bank card and the PIN number for that card before a transaction will be allowed to proceed.

It was mentioned herein at the beginning of the description of Figure 4 that there are two different screens 61 and 62 by which a viewer may enter the interactive services. The first entry screen 61 has been described hereinabove. The second screen 62 represents a screen that is displayed during normal

broadcast of a programme or an advertisement. During the broadcast an icon 179 is displayed over the picture inviting the viewer to enter the interactive services. For example, during a sports programme sponsored by a brewery an icon may be displayed offering free beer, or during an advertisement for a car an icon may be displayed inviting the viewer to book a test drive.

Data representing the icon is transmitted together with a short program containing instructions as to how the processor 23 is to respond to viewer selection of the icon. The degree of interaction required with the viewer can vary considerably depending on the wishes of the service provider. For example, if free beer is being offered the only interaction required may be for the viewer to select the icon. In such a case the processor 23 would be arranged to respond to the selection by establishing a modem connection with a predetermined number and then transmitting to that number details of the viewer. If, on the other hand, the advertisement is for a car, the service provider may require the viewer to enter the interactive services at any of levels 63 to 65 as shown in Figure 4 and interact with the displayed screens as already described herein.

As the number of service providers grows it becomes more difficult to display all of the "shops"

in the "shopping mall" on a single screen. Different screens may be displayed for different types of services. Alternatively, the screen may be arranged to display only a few of the "shops" in the "mall" at any given instant in time. Figure 12 of the accompanying drawings shows a large "mall" 180 and Figure 13 shows a screen 181 displaying only a few of the "shops" in a portion 182 of the "mall" 180. The screen 181 includes four markers 183 to 186 indicating the directions in which the "mall" extends. The arrows 183 to 185 indicate that the viewer can move to the left and right and down in the "mall" and the bar 186 indicates that the viewer cannot move up. Depending on the level of sophistication that is desired the processor 23 may be arranged either to scroll left and right, and up and down or to move stepwise in those directions. Scrolling is more sophisticated and requires greater processing power and, in order to keep down the cost of the decoder, stepwise movement is presently preferred.

It will be appreciated that the above-described interactive services are merely exemplary and that many other services can, of course, be made available within the described structure. In addition to on-line "shopping" at local or national outlets, local information and other locality-based services may be provided via the combined satellite and modem media.

Also, traditionally local services such as job placement can be made national or even international via the combined media. Furthermore, it will be possible using the above-described system for software companies, such as games manufacturers, to provide with television adverts samples of the latest games software for review by potential customers before an order is placed. Placing bets, entering lotteries, etc., will also be possible by way of the combined media.

Having thus described the present invention by reference to a preferred embodiment it is to be well understood that the embodiment in question is exemplary only and that modifications and variations such as will occur to those possessed of appropriate knowledge and skills may be made without departure from the spirit and scope of the invention as set forth in the appended claims and equivalents thereof.

CLAIMS:

1. A receiver for receiving broadcast digital television signals representing both image data and information data, the receiver being responsive to the  
5 information data to output for display data derived from said image data and said information data and representing an interactive image, and being responsive to viewer manipulation of an input device to vary the interactive image and to establish a  
10 telecommunications link to a remote site for on-line interaction via the interactive image between the viewer and the remote site.

2. A receiver as claimed in claim 1, comprising a decoder for separating the image data and the  
15 information data, a store for storing information data and a processor responsive to the stored information data.

3. A receiver as claimed in claim 2, wherein the processor is arranged to execute programs contained  
20 within the information data.

4. A receiver as claimed in claim 3, wherein the processor is arranged to respond to said viewer manipulation of the input device in accordance with

instructions included in said program data.

5        5.    A receiver as claimed in any of claims 2 to 4,  
         wherein the stored information data comprises template  
         data and the processor is arranged to construct the  
         data representing the interactive image from received  
         information data and the stored template data.

10       6.    A receiver as claimed in any of claims 2 to 5,  
         wherein the image data comprises video image data and  
         the decoder is arranged to convert said image data  
         into data representing a video image for display in  
         the interactive image.

         7.    A receiver as claimed in any preceding claim,  
         wherein the input device comprises a remote control  
         unit.

15       8.    A receiver as claimed in any preceding claim,  
         wherein the input device comprises a keypad.

         9.    A receiver as claimed in any of claims 2 to 8,  
         further comprising a modem for establishing a  
         telecommunications link.

20       10.   A receiver as claimed in claim 9, wherein the  
         processor is responsive to on-line data received via

the modem.

11. A receiver as claimed in claim 10, wherein the store is adapted to store on-line data.

12. A receiver as claimed in claim 10 or 11, wherein  
5 the processor is arranged to execute programs contained within the on-line data.

13. A receiver as claimed in claim 12, wherein the processor is arranged to respond to said viewer manipulation of the input device in accordance with  
10 instructions included in said program data.

14. A receiver as claimed in any preceding claim, wherein the interactive image comprises plural interactive screens so formed as to be individually displayable.

15. A receiver as claimed in claim 14 as dependent on claim 5, wherein the processor is arranged to derive data representing each of the interactive screens from the template data and the received information data.

16. A receiver as claimed in claim 14 or 15 as  
20 dependent on claim 10, wherein the processor is arranged to derive data representing an interactive



screen from the on-line data.

17. A receiver as claimed in any of claims 14 to 16,  
wherein the processor is arranged to display the  
interactive screens in a hierarchical order in  
5 response to viewer manipulation of the input device.

18. A receiver as claimed in any of claims 14 to 17,  
wherein the processor is arranged to derive data  
representing one of the interactive screens from data  
defining an interactive picture larger in size than  
10 the interactive screen.

19. A receiver as claimed in claim 18, wherein the  
processor is arranged to derive the interactive screen  
data as representing a portion of the interactive  
picture.

15 20. A receiver as claimed in claim 19, wherein the  
processor is arranged to respond to viewer  
manipulation of the input device by moving the portion  
over the interactive picture.

21. A receiver as claimed in claim 20, wherein the  
20 processor is arranged to move the portion in a step-  
wise manner.

22. A receiver as claimed in claim 20, wherein the processor is arranged to scroll the portion over the interactive picture.

5 23. A receiver as claimed in any preceding claim, comprising a first card reader for reading a subscriber card authorising access to broadcast signals and a second card reader for reading another card.

10 24. A receiver as claimed in claim 23, wherein the second card reader is adapted to read a card issued by a financial institution.

25. A receiver as claimed in claim 23 or 24, wherein the second card reader is adapted to read a magnetic-strip card.

15 26. A receiver as claimed in claim 23 or 24, wherein the second card reader is adapted to read a smart card.

20 27. A receiver as claimed in claim 23 or 24, wherein the second card reader is adapted to read a cash value card.

28. A method of interacting with broadcast

interactive services, the method comprising receiving signals representing both image data and information data, deriving from the data in the received signals an interactive image for display, responding to manipulation of an input device by varying the interactive image, and establishing a telecommunications link to a remote site for on-line transfer of data therewith in response to the manipulation of the input device.

29. A method as claimed in claim 28, wherein the information data comprises program data, the method further comprising executing the program defined by the program data.

30. A method as claimed in claim 29, further comprising responding to the manipulation of the input device in accordance with instructions included in said program data.

31. A method as claimed in any of claims 28 to 30, wherein the information data comprises template data, the method further comprising constructing data representing the interactive image from received information data and the template data.

32. A method as claimed in any of claims 28 to 31,

further comprising converting the image data into data representing a video image display in the interactive image.

33. A method as claimed in any of claims 28 to 32,  
5 further comprising displaying the interactive image.

34. A method as claimed in any of claims 28 to 33, further comprising establishing a telecommunications link for transmitting data to and receiving on-line data from a remote site.

10 35. A method as claimed in claim 34, wherein the on-line data comprises program data defining a program, the method further comprising executing the program defined by the program data.

15 36. A method as claimed in claim 35, further comprising responding to said manipulation of the input device in accordance with instructions included in said program data.

20 37. A method as claimed in any of claims 28 to 36, wherein the interactive image comprises plural interactive screens so formed as to be individually displayable.

38. A method as claimed in claim 37 as dependent on claim 31, wherein the interactive screens are formed depending on the template data and the received information data.

5 39. A method as claimed in claim 38 as dependent on claim 33, wherein the interactive screens are formed depending on the on-line data.

40. A method as claimed in any of claims 37 to 39, wherein the interactive screens are displayed in a hierarchical order in response to manipulation of the  
10 input device.

41. A method as claimed in any of claims 37 to 40, further comprising deriving data representing one of the interactive screens from data defining an  
15 interactive picture larger in size than the interactive screen.

42. A method as claimed in claim 41, further comprising deriving the interactive screen data as representing a portion of the interactive picture.

20 43. A method as claimed in claim 42, further comprising moving the portion over the interactive

picture in response to manipulation of the input device.

44. A method as claimed in claim 43, wherein the portion is moved in a step-wise manner.

5 45. A method as claimed in claim 43, wherein the portion is scrolled over the interactive picture.

46. An interactive services interface comprising:  
a broadcast entry level for enabling a user to select from a range of available service types;

10 a first broadcast interactive level, entered by user selection of a service type in the entry level, for enabling the user to select from a group of service providers of the selected type;

15 a second broadcast interactive level, entered by user selection of a service provider in the first broadcast interactive level, for enabling the user to select from a range of classes of goods and/or services available from the selected service provider; and

20 a third broadcast interactive level, entered by user selection of a class of goods and/or services, for enabling the user to select goods and/or services from the selected class.

47. An interactive services interface as claimed in claim 46, further comprising a first on-line interactive level entered from one of the three broadcast interactive levels for establishing an on-line connection with a remote site and for enabling the user to place an order for the selected goods and/or services with the remote site.

48. An interactive services interface as claimed in claim 47, further comprising a second on-line interactive level, entered by placing an order for the selected goods and/or services, for enabling the user to complete the order with the remote site.

49. An interactive services interface as claimed in claim 48, further comprising a third on-line interactive level, entered by completing the order, for enabling the remote site to confirm acceptance of the order with the user.

50. An interactive services interface as claimed in any of claims 46 to 49, further comprising a respective interactive screen for each of the first, second and third broadcast interactive levels.

51. An interactive services interface as claimed in claim 50, wherein the broadcast screen data comprises

template data defining the form of the broadcast  
interactive screens, which template data is broadcast  
infrequently; and respective information data for each  
interactive screen, which information data is  
5 broadcast substantially continuously.

52. An interactive services interface as claimed in  
claim 49, or claim 50 or 51 as dependent thereon,  
further comprising a respective interactive screen for  
each of the first, second and third on-line  
10 interactive levels.

53. An interactive services interface as claimed in  
claim 52, wherein each of the on-line interactive  
screens is defined by data comprising broadcast  
template data and on-line information data.

15 54. An interactive services interface as claimed in  
any of claims 46 to 53, further comprising another  
broadcast entry level for enabling a user to enter  
directly a predetermined one of the first, second and  
third broadcast interactive levels or a predetermined  
20 one of the first, second and third on-line interactive  
levels.

55. An interactive services interface as claimed in  
any of claims 46 to 54, wherein each broadcast and on-



line interactive level is displayable on a display screen.

5 56. An interactive services interface as claimed in claim 55, wherein at least one of the broadcast and on-line interactive levels is larger than the display screen and only a portion of the interactive level is displayable at a given time on the display screen.

10 57. A receiver for broadcast signals, the receiver comprising an interactive services interface as claimed in any of claims 46 to 56.

58. A receiver as claimed in claim 57, further comprising a modem for transmitting and receiving of on-line signals.

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ABSTRACTIMPROVEMENTS IN RECEIVERS FOR TELEVISION SIGNALS

A receiver for television signals is arranged to receive video signals comprising video data and information data. The receiver is arranged to respond to viewer operation of a control device (28). The receiver includes a processor (23) for processing selected information data to convert the same into signals representative thereof for output to a television in combination with the video signals. The receiver is arranged to respond to the information data to output for display data derived from said image data and said information data and representing an interactive image. The receiver is responsive to viewer manipulation of the control device to vary the interactive image and to establish a telecommunications link to a remote site for on-line interaction via the interactive image between the viewer and the remote site. The interactive image may form part of an interactive services interface comprising a broadcast entry level and plural broadcast interactive levels. The interactive services interface may comprise one or more on-line interactive levels entered from one of the broadcast interactive levels for establishing an on-line connection with a remote site.

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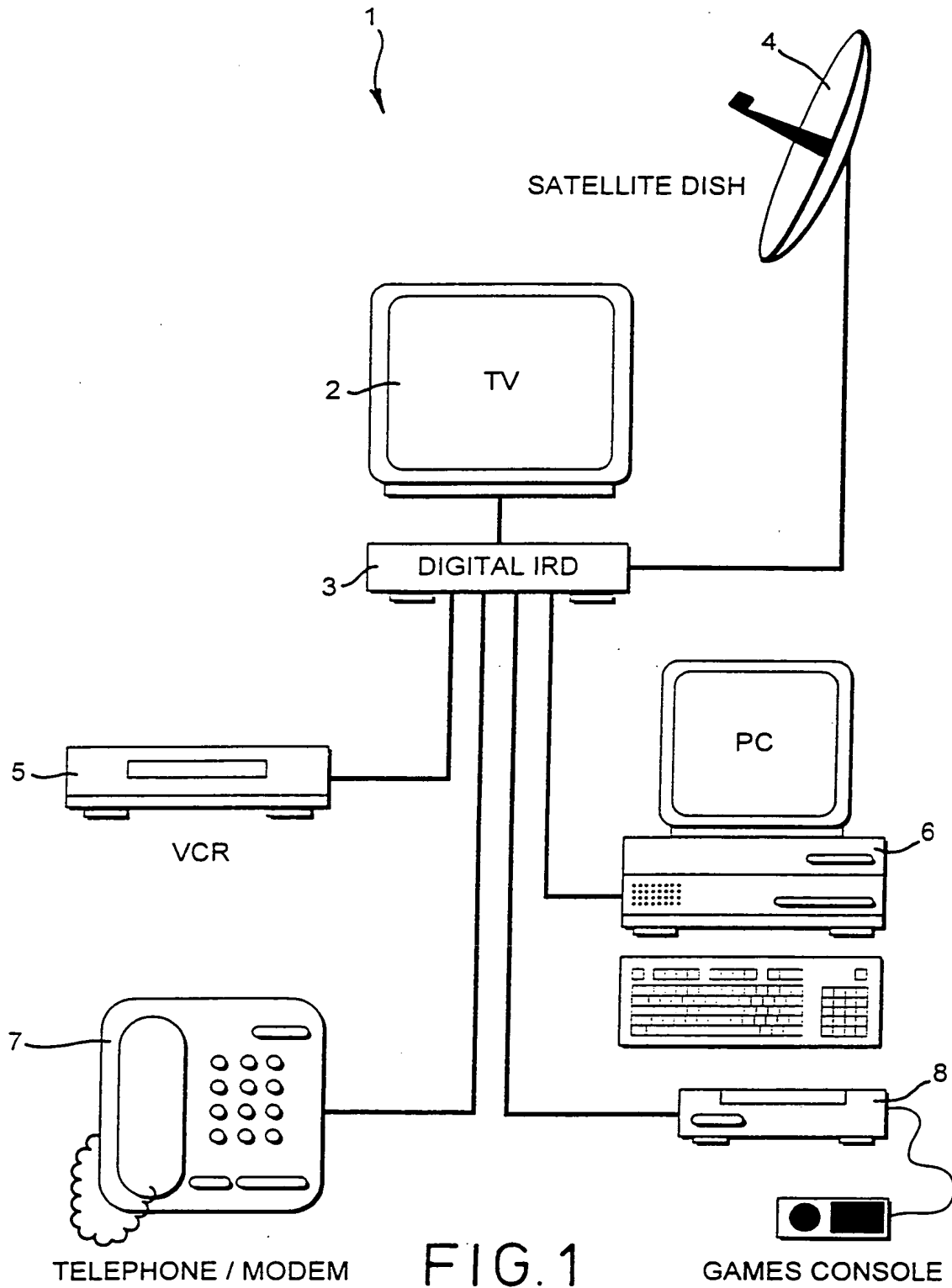
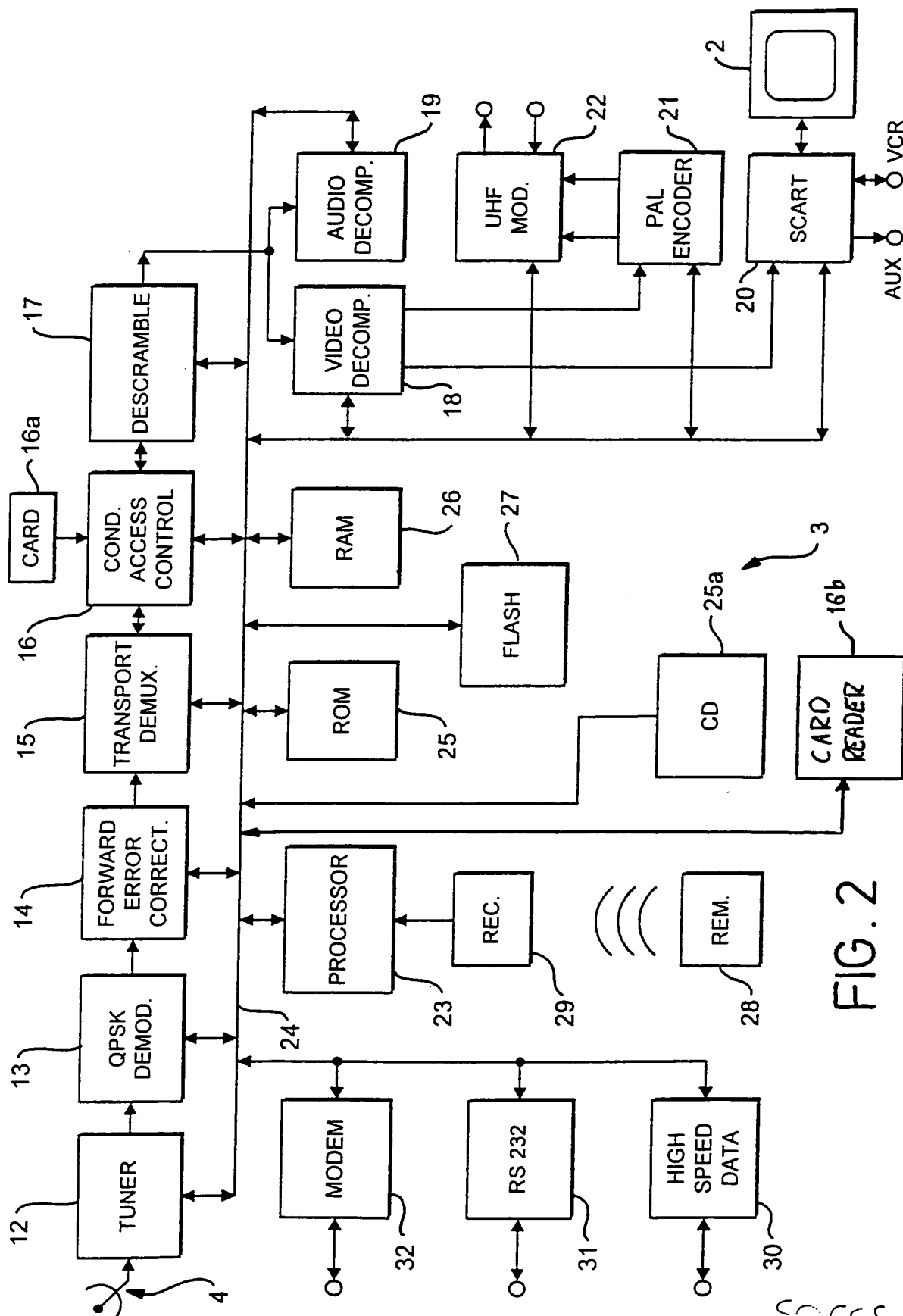


FIG. 1

Sparc

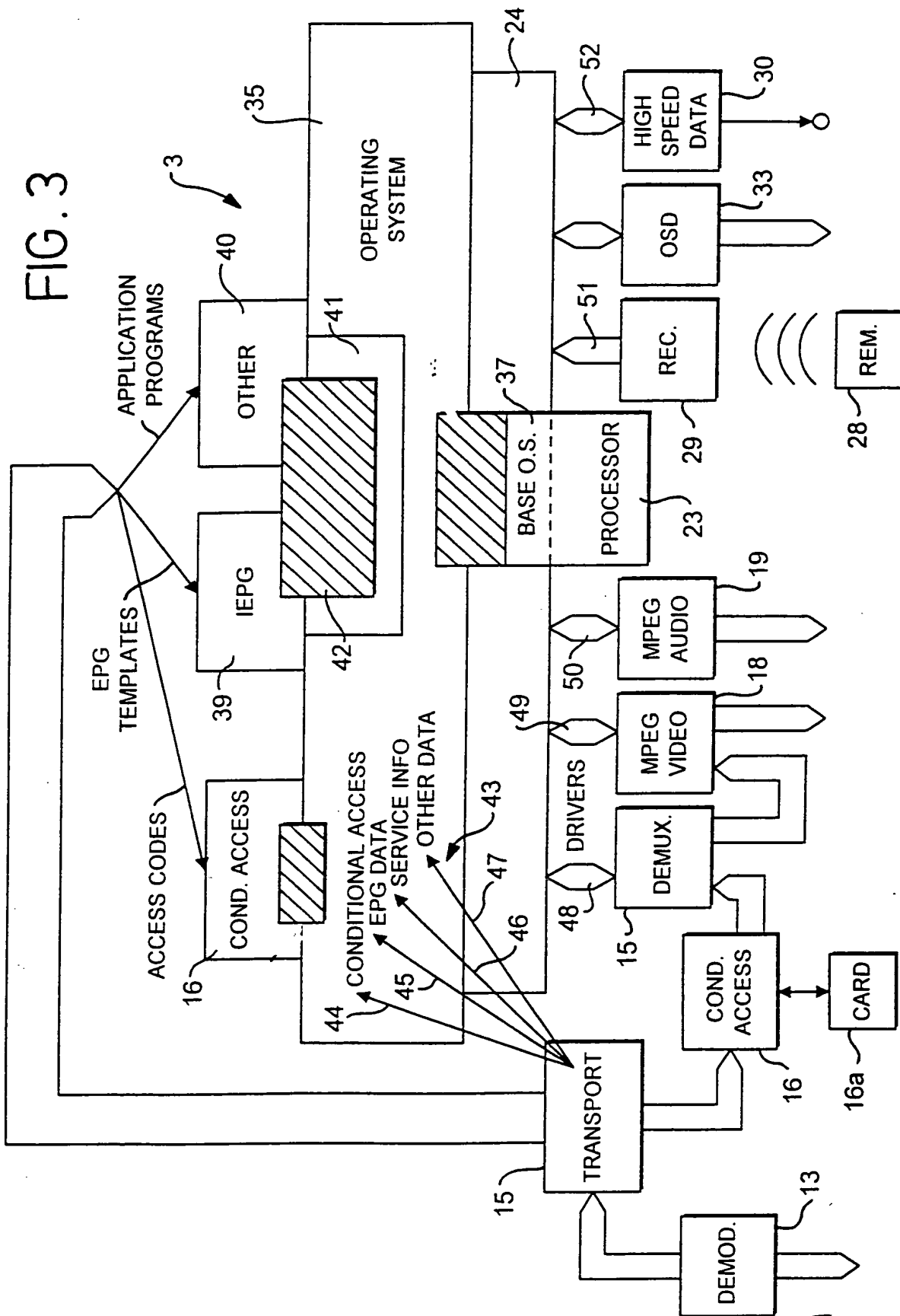
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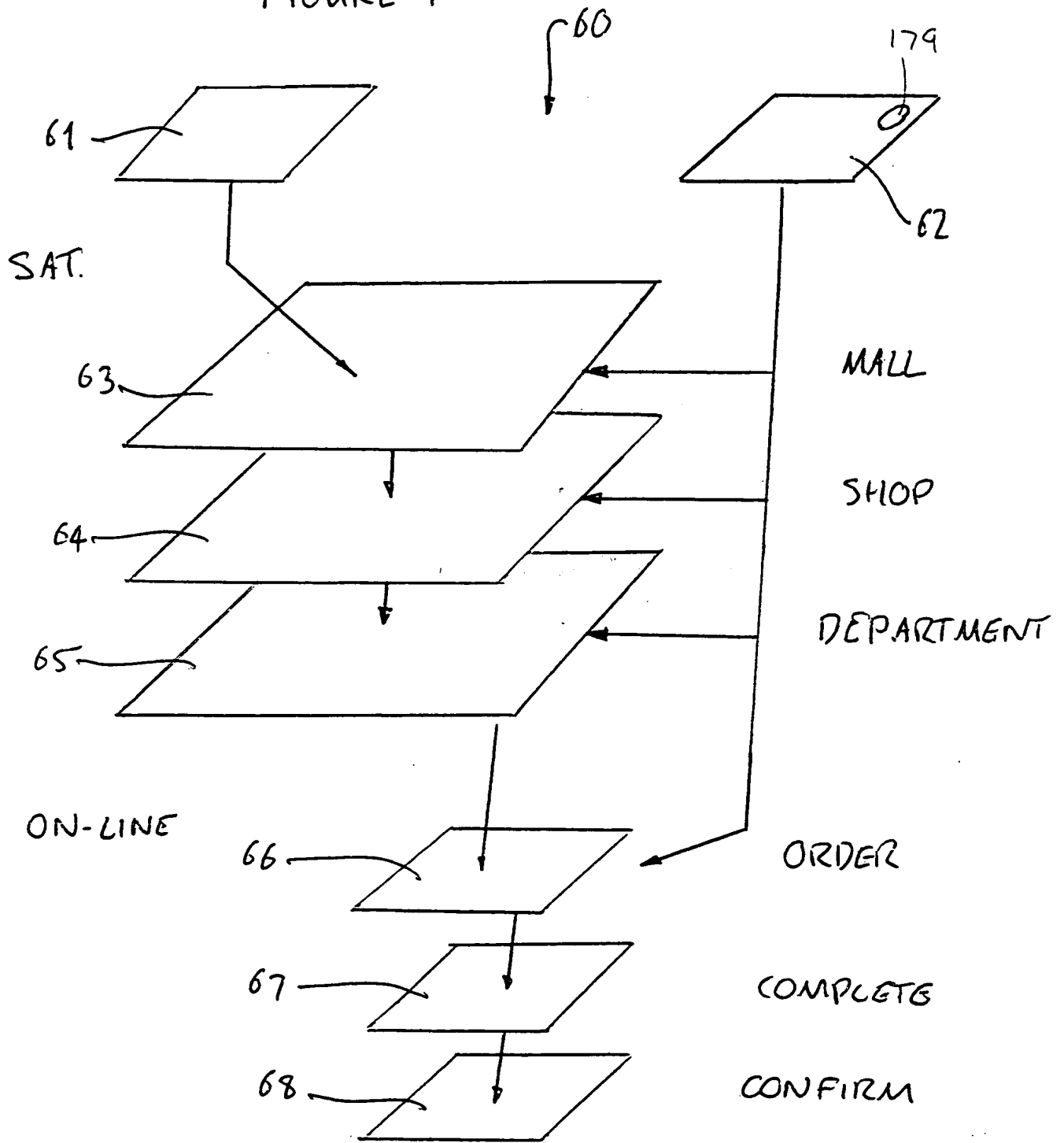
FIG. 3



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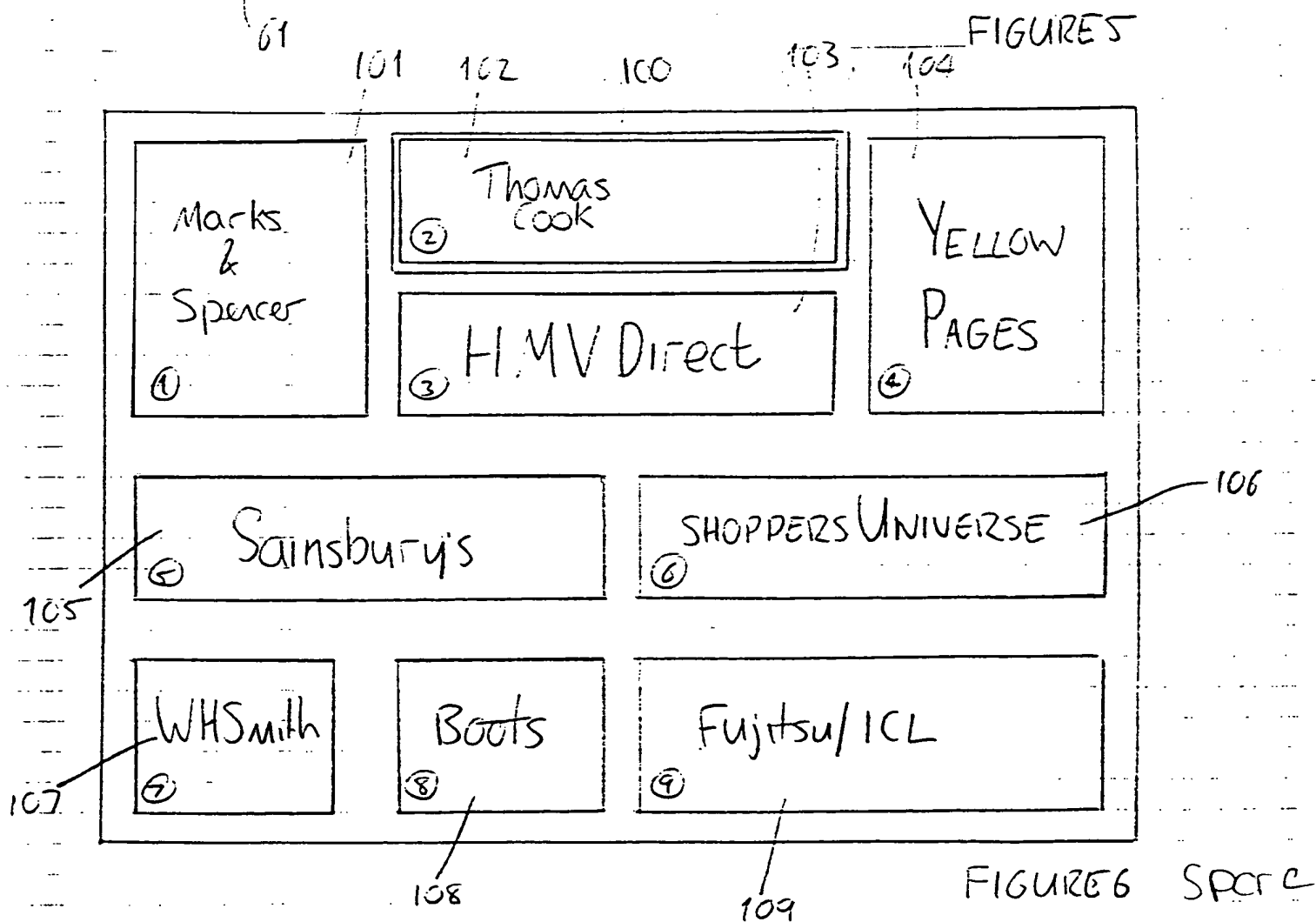
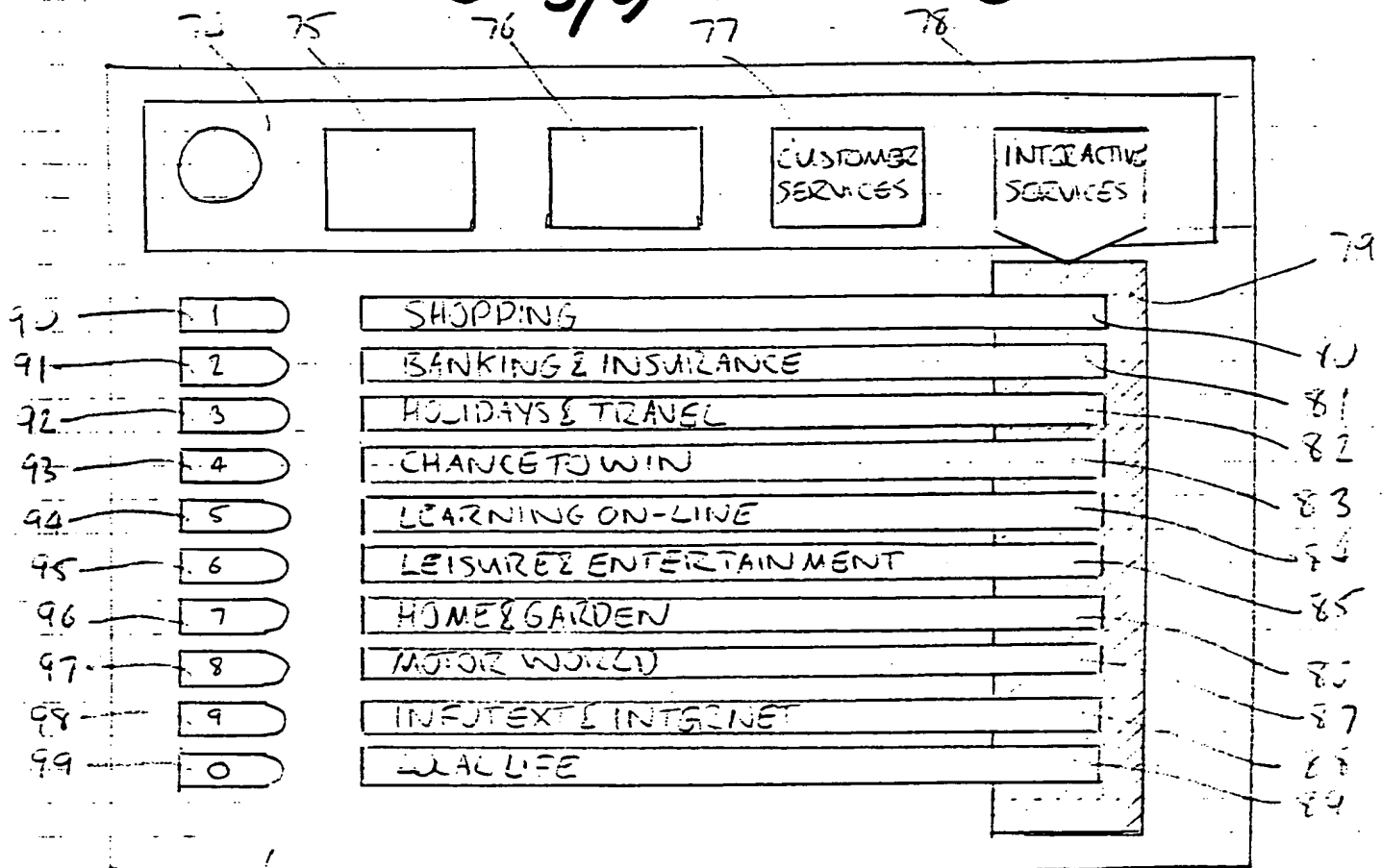
FIGURE 4



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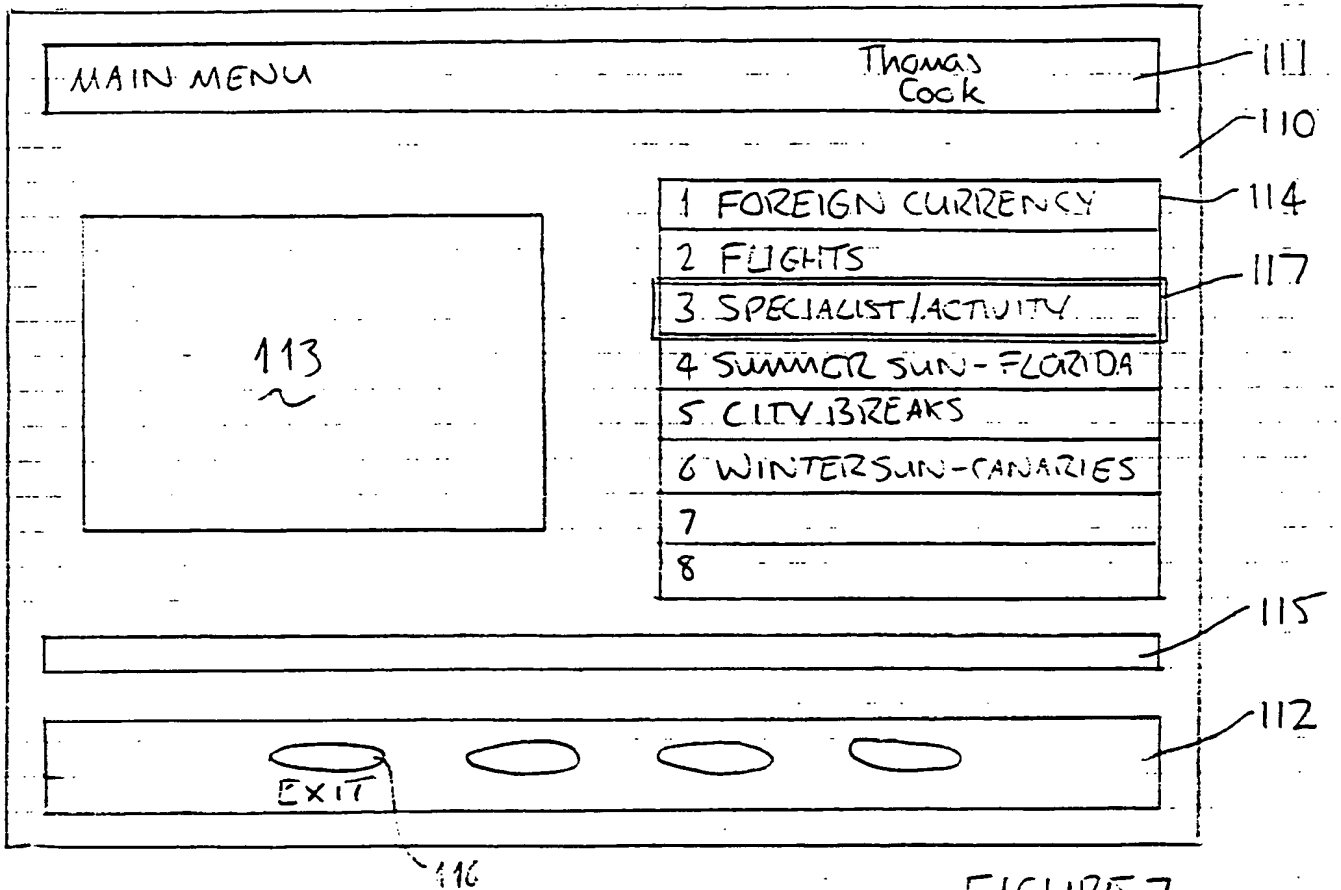


FIGURE 7

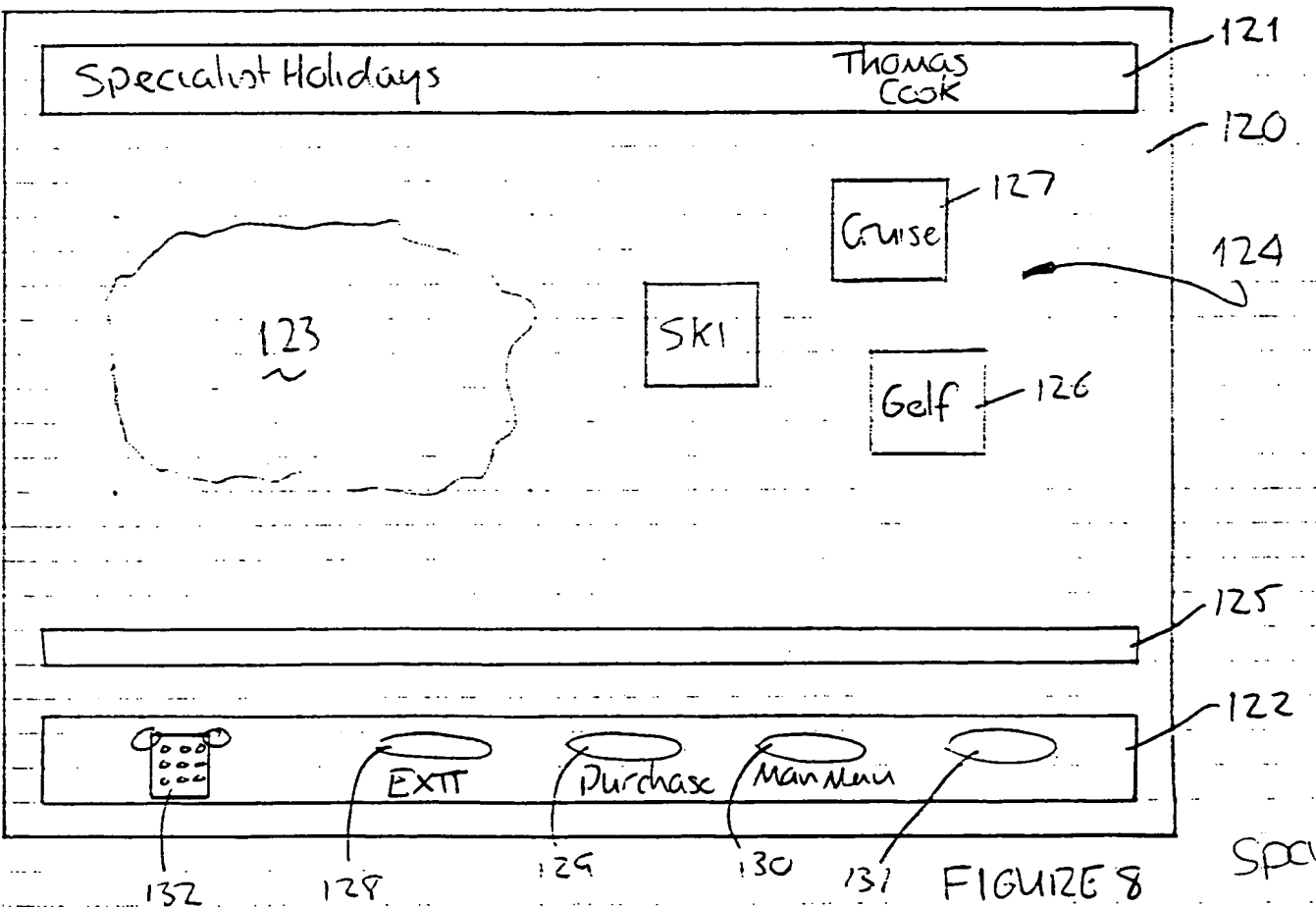


FIGURE 8

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141

140

143

145

146

143

142

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148

149

150

FIGURE 9

Your Shopping List

Sainsbury's Home Shop

↑

1. Fudge Sticks £0.99ea

1. Cheerios £1.50ea

4. SS Baked Beans £0.25ea

2. Steak Fries £2.85ea

Price: £5.70

SubTotal: £9.19

↓

DELETE CHECKOUT MAIN MENU ADD ITEM

154

153

157

155

156

158

159

160

161

FIGURE 10

SPACE

DELIVERY TIME

Sainsbury's Home Shop

DAY	DATE	TIME
MON	22 JULY	12-2 PM
TUE	23 JULY	1-3 PM
WED	24 JULY	2-4 PM
THR	25 JULY	3-5 PM
FRI	26 JULY	4-6 PM
SAT	27 JULY	5-7 PM

CANCEL ACCEPT MAIN MENU MY LIST

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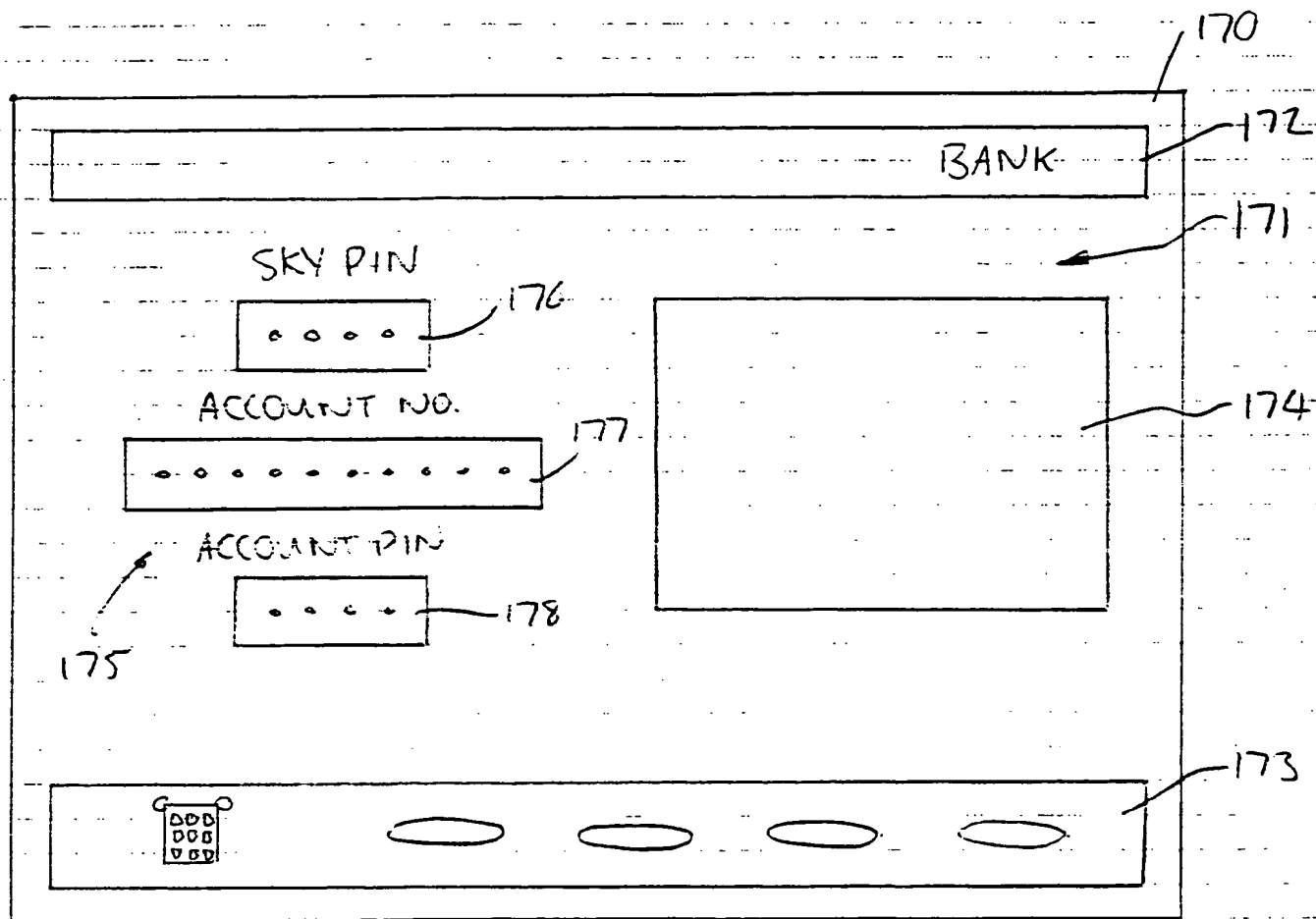


FIGURE 11

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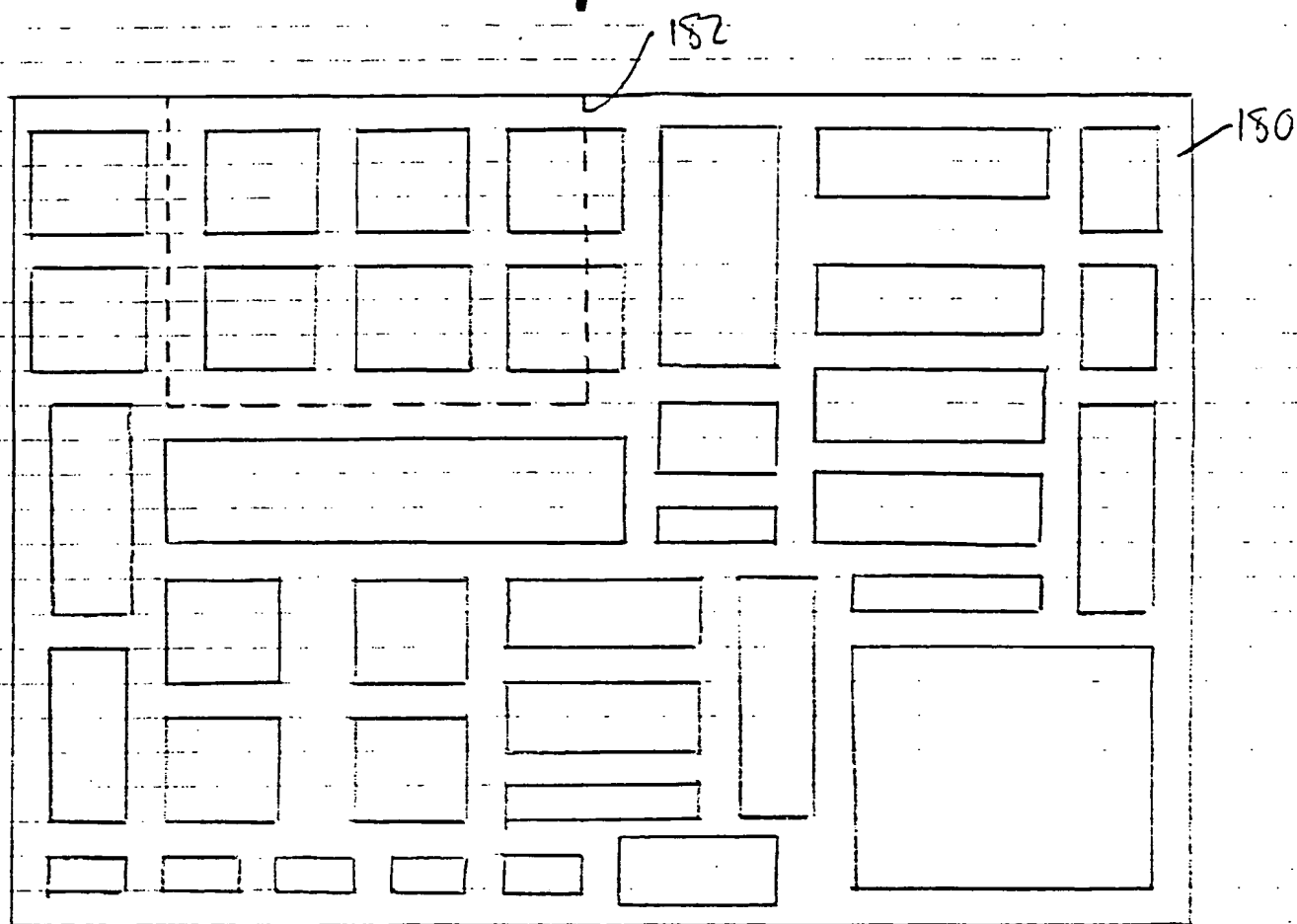


FIGURE 12

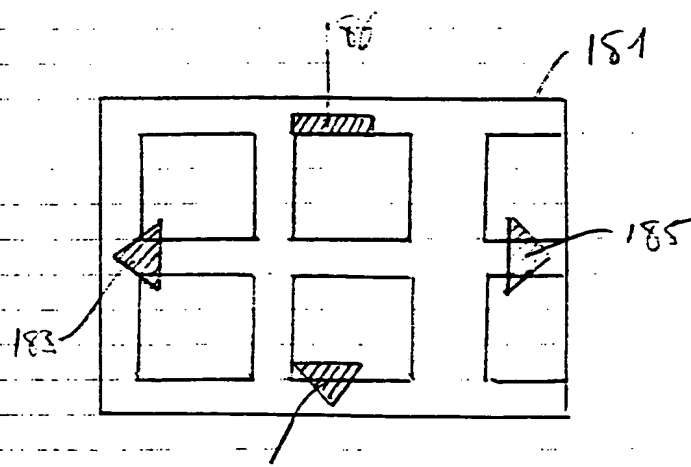


FIGURE 13

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